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**THE ADOPTION OF APPROPRIATE TECHNOLOGY MODEL FOR HARVESTING  
 THE ORGANIC RICE IN THE NEW THEORY FARMING**

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**ABSTRACT**

The purpose of research is to study and design the adoption of appropriate technology for harvesting the organic rice in the new theory farming. This paper focuses on methods of participatory action research (PAR). It involved researchers of Uttaradit Rajabhat University and 19 members of organic rice farmer group in Raiooy subdistrict, Pichai, Uttaradit province which is the part of university engagement strategic. Research instruments were an interview form and a questionnaire designed to collect the relevant data of the organic rice harvesting. The result of the study were as follows: (1) the total rice field is about 449 rai and the organic rice field is about 164 rai; (2) the maximum of organic rice field is about 25 rai and the minimum of organic rice field is about 2 rai; (3) the average size of the organic rice field is about 8.63 rai per member; and (4) there are three technology forms can be utilized: harvesting by labor, harvesting by lawn mover, and harvesting by rice combine harvester. The resolution from the meeting between researchers and farmers group was using the used rice combine harvester from Japan is the appropriate way due to low budget, effectiveness and convenience.

**Keywords:** Organic rice, Harvesting Technology, Appropriate Technology

**1. INTRODUCTION**

Organic Rice is rice that is grown and processed by organic agriculture or organic farming. There is choosing not to use synthetic or artificial chemical pesticides, fertilizers, genetically modified organisms, antibiotics and growth hormones in the overall rice production and storage duration. This is replaced with site-specific management practices that maintain and increase long-term soil fertility and prevent pest and diseases. Simultaneously, organic rice farming is an alternative that preserves the environment, produces good quality rice, and protects the health of farmer and consumer. Although Thai farmer still use the fertilizers and chemical pesticides in the organic rice farming, the present use is very low. Each region of Thailand has appropriate technology for the organic rice production that is urgently policy in the process of research and development. Besides the production for domestic consumption, they can also expand their production for export markets (Organic rice research institute, 2005).

Currently, organic rice farmer group in Raiooy subdistrict, Pichai, Uttaradit province has changed form traditional to organic farming, especially organic rice. Monoculture is one of most traditional farming, such as rice, corn, etc. The major problems with monoculture are Price falls as the same product to the market simultaneously, soil structure and quality is so poor, and huge amounts of water use. These are the causes of poverty. Subsequently, there is promotion with a new theory on land and water management. The "New Theory" introduced by His Majesty King Bhumibol of Thailand. The implementation of the New Theory will help farmers achieve to sustain their lives and bring them prosperity (The Chaipattana Foundation, 2016). To adopt the New Theory, farmers are advised to divide the land into four parts with a ratio of 30:30:30:10. The first 30% is designated for a pond to store rainwater during the rainy season while during the dry season it serves to supply water to grow crops and raise aquatic animals and plants. The second 30% is set aside for rice cultivation during the rainy season for the family's daily consumption throughout the year to cut down on expenses and allow the farmers to be self-reliant. The third 30% is used for growing fruit and perennial trees,



vegetables, field crops and herbs for daily consumption. If there is any surplus, it will be sold. The last 10% is set aside for accommodation, animal husbandry, roads and other structures.

According to pre-survey in the organic rice production of farmer group in Raiooy subdistrict, it has been found that harvesting process facing labor shortage. Even though there are using the combine harvester in harvesting, they still have some restriction. The service providers of combine harvesters also serve in rice fields with chemicals. Therefore, the machine must clean the contaminants before harvest. This process wastes a lot of time and money. Then, operators often neglect cleaning to save time for serving other farmers. Consequently, organic farmers must solve the problem of contamination by sorting out the first harvested paddy or by mixing it with the normal paddy. The cost of harvesting increased. In addition, the purchase of harvesters to use only organic rice farmers to prevent chemical contamination can not be achieved because the machine is very expensive.

From this problem, the researchers have the idea to develop the appropriate technology for organic rice harvesting in the new theory farming. To improve the efficiency of organic rice harvest. And keep up the quality standards of organic rice next.

## 2. METHODOLOGY

The purpose of research is to study and design the adoption of appropriate technology for harvesting the organic rice in the new theory farming. This paper focuses on methods of participatory action research (PAR) (MacDonald, 2012). It involved researchers of Uttaradit Rajabhat University and 19 members of organic rice farmer group in Raiooy subdistrict, Pichai, Uttaradit province using a purposive method (Phrae rice seed center, 2017) which is the part of university engagement strategic (Uttaradit Rajabhat University, 2017). Research instruments were an interview form and a questionnaire designed to collect the relevant data of the organic rice harvesting. Moreover, the data collection technique used by collecting various journal articles, documents, books that related to adopt appropriate technology model for harvesting. The data from interview forms and questionnaires was analyzed using descriptive statistics to represent the entire population or sample.

The most important content of the PAR method is that people involved in problem solving together (Boonsri 2009). The authors divided the study into four stages. The first stage involved collection of data covering general information of the sample, knowledge and understanding of organic rice harvesting process. The second stage involved analysis of the relationship between factors with the different technologies of harvesting, harvesting process, necessary facilities, and costs of organic rice harvesting. The third stage involved conclusion the proper methods for organic rice harvesting in the new theory farming. And the fourth stage involved comparison of the costs of each form of organic rice harvesting technology in the in the new theory farming.

## 3. RESULTS AND DISCUSSION

From the literature review, it was found that there were five major stages of the rice production process: soil preparation, planting, care and maintenance, harvesting, and threshing. Harvesting is an important step that affects quality and yield of paddy. (Chadavadh 2006).

The results from the questionnaires were as followed. There were 19 organic rice farmers completed structured questionnaires. Majority of samplings were female (58%), age between 41-60 years old (53%), primary and secondary education (64%). The farmers have an average of 19 years of experience in non-organic rice farming (2 years min. and 40 years max.) and an average of 4.3 years of experience in organic rice farming (1 year min. and 10 years max.). The cultivated area of each farmer used are shown in the table 1 below.

**Table 1: The cultivated area of each farmer used**

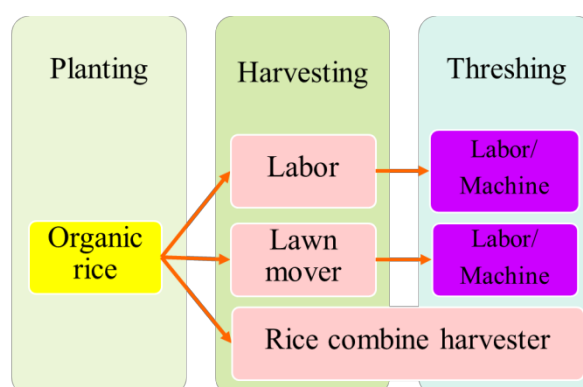
Field (rai*)	Plot No.																		Total
	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1	1	1	1	al
										0	1	2	3	4	5	6	7	8	9



Total rice field	3	7	8	1	1	1	1	3	5	8	3	2	6	4	3	2	1	3	5	449
	2			2	7	0	2	4			2	5	0	0	0	2	5	0	0	
Organic rice field	1	7	6	6	1	6	2	2	5	1	8	1	7	8	1	3	7	5	5	164
	0				4			5		0		5			5					

\*A rai is a unit of area equal to 1,600 square metres

From Table 1, the total rice field is about 449 rai and the organic rice field is about 164 rai. The maximum of organic rice field is about 25 rai and the minimum of organic rice field is about 2 rai. The average size of the organic rice field is about 8.63 rai per member. And there are three technology forms can be utilized: harvesting by labor, harvesting by lawn mover, and harvesting by rice combine harvester. Figure 1 is a diagram showing the selection forms of organic rice harvesting technology.



**Figure 1: the selection forms of organic rice harvesting technology.**

Table 2 below shows an example of costs of the three harvesting technology forms:

- manual cutting by labor + machine threshing by contracted labor and machine;
- manual cutting by labor and lawn mover + machine threshing by contracted labor and machine;
- combine harvester by contracted labor and machine.

**Table 2: example of costs of the three harvesting technology forms**

	Labor	lawn mover	combine harvester
Total fields (rai)	164	164	164
Labor for cutting (rai/day/operated unit)	1	4	20
Labor for cutting (person/day)	5	2	2
Labor rate (300 bahts/day)	1,500	600	600
Total cutting days (day)	32.80	20.50	8.20
Total labor cost	49,200	12,300	4,920
Total Machine Rental fees (baht)			98,400
Fuel cost (baht)		1,230	
Threshing cost (baht)	27,880	27,880	
Total Cost (baht)	77,080	41,410	103,320
Average Cost/rai (baht)	470	252.5	630

\*A rai is a unit of area equal to 1,600 square metres, \*\*1 US dollar ≈ 33 baht

From Table 2, it was found that the using combine harvester technology resulted in the highest overall cost. In practice, it is possible to decrease the harvest time more effectively than any other three to four times. However, there are restrictions on waiting for service. Therefore, the most appropriate harvesting technology today is cutting by lawn mowers because it has the lowest total cost.



#### 4. CONCLUSIONS

Harvest technology has many types. There are several manufacturers. It may have different sizes and capacities. The price of the machine is different. The calculation model is only a guide to the farmers' decisions. The model is an overview of farmer groups. Disruption of rice plots could increase transportation costs, installation costs, or other relevant conditions. Therefore, in the next research, researchers and farmers may need to consider the details or factors necessary to make the model more clear and effective.

Each alternative may have different advantages and disadvantages, purchasing of new agricultural machinery for harvesting is very high cost, waiting for the local farmer to refuse the harvest, participating with the research team to develop agricultural machinery may take a lot of time and budget to research.

The study of the agricultural machinery factory by the research team with farmers. We found the alternative to buy used machinery from abroad which saving cost and easy to change. It can also be used as a prototype model to improve more effective as well.

#### 5. ACKNOWLEDGMENTS

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